

ABSTRACT

A fuel cell comprises a first and a second electrodes, a proton permeable layer, a fuel delivery layer and a reactant delivery layer. The first and the second electrodes are configured to define a reaction region, where the first electrode configured as a cathode and the second electrode configured as an anode. The proton permeable layer is positioned between the first and the second electrodes. The fuel delivery device is configured to provide fuel to the first electrode. The reactant delivery device is configured to provide reactant to the second electrode, where the reactant reacts with protons from the fuel to generate a current. Where the fuel penetrates into the first electrode.